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IS 915 (2012): Laboratory Glassware - One-mark Volumetric Flasks [CHD 10: Glassware]

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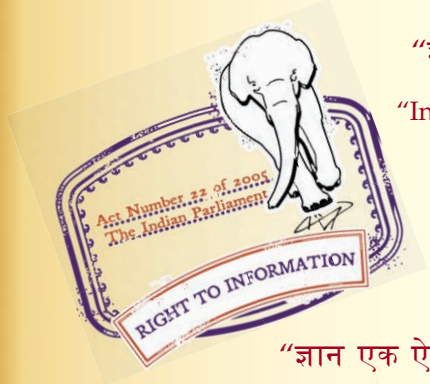

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"Knowledge is such a treasure which cannot be stolen"

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IS 915 : 2012
ISO 1042 : 1998

भारतीय मानक

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(तीसरा पुनरीक्षण)

Indian Standard

LABORATORY GLASSWARE — ONE-MARK VOLUMETRIC FLASKS

(Third Revision)

ICS 17.060

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 2012 **Price Group 4**

NATIONAL FOREWORD

This Indian Standard (Third Revision) which is identical with ISO 1042 : 1998 'Laboratory glassware — One-mark volumetric flasks' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Glass, Glassware and Laboratoryware Sectional Committee and approval of the Chemical Division Council.

This standard was first published in 1958 and subsequently revised in 1975. However keeping in view the trend at the level of International Organization for Standardization followed in ISO 1042 : 1998 this standard was further revised in 2006. During this revision, the Committee felt that it would be more convenient to prepare this standard by adoption of ISO 1042 on dual number basis.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards wherein the standard atmospheric conditions to be observed are stipulated which are not applicable to tropical/subtropical countries. The applicable standard atmospheric conditions for Indian conditions are 27 ± 2°C and 65 ± 5 percent relative humidity and shall be observed while using this standard.

In this adopted standard, reference appears to the following International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 383 : 1976 Laboratory glassware — Interchangeable conical ground joints	IS 5165 : 1969 Interchangeable conical ground glass joints	Technically Equivalent
ISO 384 : 1978 Laboratory glassware — Principles of design and construction of volumetric glassware	IS 8729 : 1977 Principles of construction and adjustment of volumetric glassware	do
ISO 719 : 1985 Glass —Hydrolytic resistance of glass grains at 98°C — Method of test and classification	IS 2303 (Part 1/Sec 1) : 2012 Grading glass: Part 1 Method of test and classification, Section 1 Hydrolytic resistance of glass grains at 98°C (*second revision*)	Identical
ISO 4787 : 1984[1)] Laboratory glassware — Volumetric instruments — Methods for testing of capacity and for use	IS/ISO 4787 : 2010 Laboratory glassware — Volumetric instruments — Methods for testing of capacity and for use	Technically Equivalent

This standard also makes a reference to the BIS Certification Marking of the product. Details of which is given in National Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

[1)] Since revised in 2010.

Indian Standard

LABORATORY GLASSWARE — ONE-MARK VOLUMETRIC FLASKS

(Third Revision)

1 Scope

This International Standard specifies requirements for an internationally acceptable series of one-mark volumetric flasks, suitable for general laboratory purposes.

The specifications in this International Standard are in conformity with ISO 384 and with OIML Recommendation No. 4.

2 Normative references

The following standards contain provisions which, through references in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 383:1976, *Laboratory glassware — Interchangeable conical ground joints.*

ISO 719:1985, *Glass — Hydrolytic resistance of glass grains at 98 °C — Method of test and classification.*

ISO 4787:1984, *Laboratory glassware — Volumetric glassware — Methods for use and testing of capacity.*

3 Basis of adjustment

3.1 Unit of volume

The unit of volume shall be the millilitre (ml) which is equivalent to the cubic centimetre (cm^3).

NOTE — The term millilitre (ml) is commonly used as a special name for the cubic centimetre (cm^3), in accordance with a decision of the twelfth Conférence Générale des Poids et Mesures. The term millilitre is acceptable, in general, for references in International Standards to capacities of volumetric glassware and it is used, in particular, in the present text.

3.2 Reference temperature

The standard reference temperature, i.e. the temperature at which the volumetric flask is intended to contain its nominal volume (nominal capacity), shall be 20 °C.

When the flask is required for use in a country which has adopted a standard reference temperature of 27 °C, however, this value shall be substituted for 20 °C.

4 Classes of accuracy

Two classes of accuracy are specified:

— **Class A** for the higher grade,

— **Class B** for the lower grade.

5 Series of capacities

The series of nominal capacities of one-mark volumetric flasks is as follows (in millilitres):

1 - 2 - 5 - 10 - 20 - 25 - 50 - 100 - 200 - 250 - 500 - 1 000 - 2 000 - 5 000

All these flasks may be finished with a plain neck or may include a stopper.

NOTE — If volumetric flasks of capacities other than those listed above are required, it is recommended that they conform, as far as possible, to the essential requirements of this International Standard.

6 Definition of capacity

The capacity of a volumetric flask is defined as the volume of water at 20 °C, expressed in millilitres, contained by the flask at 20 °C, when filled to the graduation line.

Where, exceptionally, the reference temperature is 27 °C, this value shall be substituted for 20 °C.

Setting the meniscus shall be performed according to ISO 4787:

The meniscus is set so that the plane of the top edge of the graduation line is horizontally tangential to the lowest point of the meniscus, the line of sight being in the same plane.

7 Accuracy

The capacity of the flasks shall not differ from the nominal capacity by more than the maximum permitted errors shown in tables 1 and 2.

8 Construction

8.1 Material

Volumetric flasks shall be made from glass of hydrolytic class not lower than HGB3 in accordance with ISO 719 with a coefficient of thermal expansion not exceeding $3{,}3 \times 10^{-6}\ °C^{-1}$.

NOTE — Borosilicate glass 3.3 in accordance with ISO 3585 is included in this requirement.

The glass shall be as free as possible from visible defects and reasonably free from internal stress, which would impair the performance of the flasks.

8.2 Wall thickness

Volumetric flasks shall be sufficiently robust in construction to withstand normal usage and the wall thickness shall show no gross departures form uniformity.

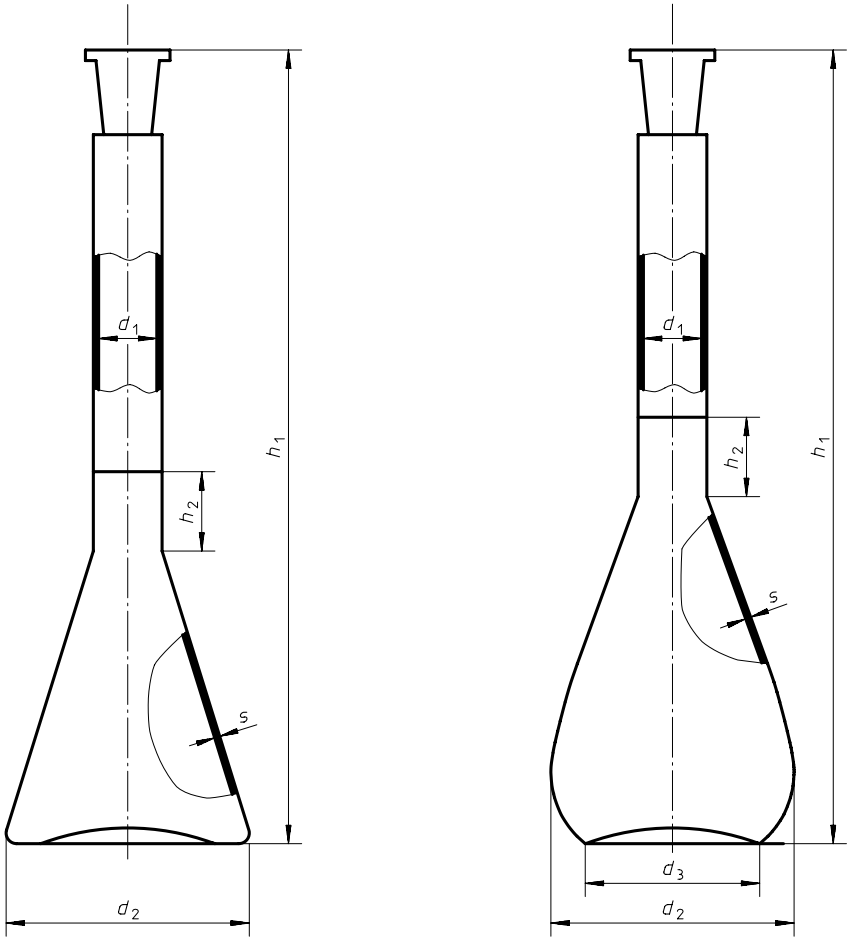

Figure 1 — One-mark volumetric flasks showing alternative shapes

Table 1 — Dimensions and maximum permitted errors for narrow-necked flasks

Essential dimensions			Tolerances		Recommended dimensions					
Nominal capacity	Internal neck diameter	Distance of graduation line[1)]	Maximum permitted errors		Overall height[2)]	Bulb diameter	Base diameter	Wall thickness	Ground joint[3)]	
			Class A	Class B					k4	k6
ml	d_1 mm	h_2 mm min.	ml	ml	h_1 ± 5 mm	d_2 mm (approx.)	d_3 mm min.	s mm min.		
1	7 ± 1	5	± 0,025	± 0,050	65	13	13	0,7	7/11	7/16
2	7 ± 1	5	± 0,025	± 0,050	70	17	15	0,7	7/11	7/16
5	7 ± 1	5	± 0,025	± 0,050	70	22	15	0,7	7/11	7/16
10	7 ± 1	5	± 0,025	± 0,050	90	27	18	0,7	7/11	7/16
20	9 ± 1	5	± 0,040	± 0,080	110	39	18	0,7	10/13	10/19
25	9 ± 1	5	± 0,040	± 0,080	110	40	25	0,7	10/13	10/19
50	11 ± 1	10	± 0,060	± 0,120	140	50	35	0,7	12/14	12/21
100	13 ± 1	10	± 0,100	± 0,200	170	60	40	0,7	12/14[4)]	12/21[4)]
200	15,5 ± 1,5	10	± 0,150	± 0,300	210	75	50	0,8	14/15	14/23
250	15,5 ± 1,5	10	± 0,150	± 0,300	220	80	55	0,8	14/15	14/23
500	19 ± 2	15	± 0,250	± 0,500	260	100	70	0,8	19/17	19/26
1 000	23 ± 2	15	± 0,400	± 0,800	300	125	85	1,0	24/20	24/29
2 000	27,5 ± 2,5	15	± 0,600	± 1,200	370	160	110	1,2	29/22	29/32
5 000	38 ± 3	15	± 1,200	± 2,400	475	215	165	1,2	34/23	34/35

1) Minimum distance of graduation line from any point of change of diameter.
2) Overall height without stopper in accordance with figure 1.
3) In accordance with ISO 383.
4) Alternative ground joint size 14/15 and 14/23.

Table 2 — Dimensions and maximum permitted errors for wide-necked flasks

Essential dimensions			Tolerances		Recommended dimensions					
Nominal capacity	Internal neck diameter	Distance of graduation line[1)]	Maximum permitted errors		Overall height[2)]	Bulb diameter	Base diameter	Wall thickness	Ground joint[3)]	
			Class A	Class B					k4	k6
ml	d_1 mm	h_2 mm min.	ml	ml	h_1 ± 5 mm	d_2 mm (approx.)	d_3 mm min.	s mm min.		
5	9 ± 1	5	± 0,040	± 0,080	70	22	15	0,7	10/13	10/19
10	9 ± 1	5	± 0,040	± 0,080	90	27	18	0,7	10/13	10/19
20	11 ± 1	5	± 0,060	± 0,120	105	39	18	0,7	12/14	12/21
25	11 ± 1	5	± 0,060	± 0,120	110	40	25	0,7	12/14	12/21
50	13 ± 1	10	± 0,100	± 0,200	140	50	35	0,7	14/15	14/23
1 000	27,5 ± 2,5	15	± 0,600	± 1,200	300	125	85	1,0	29/22	29/32

1) Minimum distance of graduation line from any point of change of diameter.
2) Overall height without stopper in accordance with figure 1.
3) In accordance with ISO 383.

8.3 Shape

The body of the flask may be pear-shaped or conical, as shown in figure 1, so as to provide a large base on which the flask shall stand with its axis vertical without rocking or spinning. Other shapes of flasks are also admissible. Flasks of capacity 25 ml and larger shall not topple, when placed empty (without stopper) on a surface inclined at an angle of 15° to the horizontal. Flasks of capacity below 25 ml shall not topple, when similarly tested at an angle of 10° to the horizontal. Details about the dimensions in figure 1 are given in tables 1 and 2.

NOTE — The internal neck diameter and the distance of the graduation line from any point of change of diameter are essential dimensions for the accuracy of the flasks. The recommended dimensions in tables 1 and 2 have been found suitable for particular use and size.

Table 3 — Shape of flask body

Nominal capacity, ml	**Shape of body**
1 and 2	conical (see figure 1)
5 to 50	conical or pear-shaped
100 to 5 000	pear-shaped (see figure 1)

8.4 Neck

The neck of the flask, excluding the socket and bulge if present, shall be approximately cylindrical and there shall be no undue variation in internal diameter or wall thickness. The axis of the neck shall be perpendicular to the plane of the base of the flask.

The top of the neck of a plain neck flask shall be finished with a strengthening flange. Such necks, which are suitable for stoppers, shall be ground to a socket size complying with the provisions of ISO 383, and shall be selected from the k4 or k6 series of this International Standard. Tables 1 and 2 give an overview of all essential and recommended dimensions of the volumetric flasks.

There may be an enlargement of diameter in the neck below the ground joint to enable better mixing of liquid.

8.5 Stopper

The stopper, if provided, shall be a good fit in the flask neck and may be of glass, solid or hollow-blown, or of a suitably inert plastics material.

8.6 Dimensions

Volumetric flasks shall comply with the essential dimensions shown in tables 1 and 2, these dimensions being considered to be essential for accuracy and convenience in use. The recommended dimensions listed in tables 1 and 2 provide guidance as they have proved satisfactory in use. The graduation line shall be placed in the lower two-thirds of the neck of the flask, and shall be not less than the stated minimum distance from any point at which the neck begins to change in diameter.

9 Graduation line

The graduation line shall be a clean, permanent, uniform line, of thickness not exceeding 0,4 mm, lying in a plane parallel to the base of the flask and completely encircling its neck.

10 Test method for capacity and accuracy

Testing of capacity and accuracy shall be performed according to ISO 4787.

11 Marking and designation

11.1 The following shall be permanently marked on each volumetric flask:

NOTE — The permanence of marking may be assessed by the test methods specified in ISO 4794.

a) a number indicating the nominal capacity;

b) the symbol "ml" or "cm^3" to indicate the unit of volume;

NOTE — The 1 000 ml, 2 000 ml and 5 000 ml flasks may, if desired, be inscribed in terms of the litre in place of the millilitre.

c) the inscription "20 °C" to indicate the standard reference temperature (but see 3.2 for a reference temperature of 27 °C);

d) a suitable abbreviation to indicate that the flask has been adjusted to contain its indicated capacity. In order to obviate language difficulties, it is recommended that the letters "In" should be used for this purpose;

e) the letter "A" or "B" to indicate the class of accuracy of the volumetric flask and the tolerance in accordance with table 1 or 2. Wide-necked flasks shall be marked with "AW" or "BW" and the tolerance;

f) the maker's or vendor's name or mark;

g) in the case of a flask with an interchangeable stopper, the size number of the joint shall be marked on the flask;

h) the glass material in accordance with 8.1.

11.2 An individual identification number shall be permanently marked on each class A or AW volumetric flask intended for official verification or certification.

11.3 Designation of a narrow-necked volumetric flask, Class A, body shape conical with a nominal capacity of 50 ml:

Volumetric flask ISO 1042 — A50-C

Designation of a narrow-necked volumetric flask, Class B, body pear-shaped with a nominal capacity of 25 ml:

Volumetric flask ISO 1042 — B25-P

Wide-necked volumetric flasks are designated by an additional "W" behind the accuracy class designation "A" or "B".

12 Visibility of graduation line, figures and marking

12.1 All figures and marking shall be of such size and form as to be clearly legible under normal conditions of use.

12.2 The graduation line, the figures and the marking shall be clearly visible and permanent, under normal conditions of use.

Annex A
(informative)

Bibliography

[1] ISO 384:1978*, Laboratory glassware — Principles of design and construction of volumetric glassware.*

[2] ISO 3585:1991, *Borosilicate glass 3.3 — Properties.*

[3] OIML R 4:1970, International Recommendation No. 4 — *Volumetric flasks (one mark) in glass.*

[4] ISO 4794:1982, *Laboratory glassware — Methods for assessing the chemical resistance of enamels used for colour coding and colour marking.*

NATIONAL ANNEX A
(*National Foreword*)

A-1 PACKING

The flasks shall be packed as agreed to between the purchaser and the supplier.

A-2 BIS CERTIFICATION MARKING

The product may also be marked with the Standard Mark.

A-2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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